

## CLAIMS

What is claimed is:

- 1    1.    An integrated circuit device comprising:  
2            an index generator to generate an index based on a search value;  
3            a memory to store a plurality of data values, the memory being coupled to receive  
4                    the index from the index generator and being adapted to output, according to  
5                    the index, a first data value of the plurality of data values;  
6            a compare circuit to compare the first data value with the search value and to  
7                    generate a match signal indicative of whether the first data value matches the  
8                    search value; and  
9            an interface to output the match signal and the index from the integrated circuit  
10           device.
- 1    2.    The integrated circuit device of claim 1 wherein the index generator is adapted to  
2           generate an index having fewer constituent bits than the search value.
- 1    3.    The integrated circuit device of claim 1 wherein the index generator includes an  
2           assembler circuit to select a portion of the search value, the index being generated  
3           based on the portion of the search value.
- 1    4.    The integrated circuit device of claim 3 wherein the portion of the search value  
2           includes a first field at a first location within the search value.
- 1    5.    The integrated circuit device of claim 4 wherein the portion of the search value  
2           further includes a second field at a second location within the search value, the  
3           second field being separated from the first field by at least one bit of the search

4 value.

1 6. The integrated circuit device of claim 3 further comprising a configuration circuit  
2 coupled to the index generator to provide a select value thereto, the assembler  
3 circuit being responsive to the select value to select the portion of the search value.

1 7. The integrated circuit device of claim 6 wherein the portion of the search value  
2 includes a first field formed by a first number of contiguous bits, the first number of  
3 contiguous bits being indicated by the select value.

1 8. The integrated circuit device of claim 7 wherein the portion of the search value  
2 includes a second field formed by a second number of contiguous bits, the second  
3 number of contiguous bits being indicated by the select value.

1 9. The integrated circuit device of claim 8 wherein the second field is separated from  
2 the first field by at least one bit.

1 10. The integrated circuit device of claim 1 wherein the index is a hash index and  
2 wherein the index generator includes a hash function circuit to process at least a  
3 portion of the search value according to a predetermined hash function to generate  
4 the hash index.

1 11. The integrated circuit device of claim 1 wherein the index generator includes a  
2 logic circuit to divide at least a portion of the search value by a predetermined value  
3 to generate the index.

1 12. The integrated circuit device of claim 1 wherein the index generator includes a

2 logic circuit to process at least a portion of the search value according to a  
3 predetermined algorithm to generate the index.

1 13. The integrated circuit device of claim 1 wherein the logic circuit is a cyclic  
2 redundancy check (CRC) circuit.

1 14. The integrated circuit device of claim 1 wherein the index generator comprises:  
2 a plurality of hashing circuits to process the search value to generate a plurality of  
3 hash values; and  
4 a hash function select circuit to select one of the hash values to be the index.

1 15. The integrated circuit device of claim 14 wherein each of the plurality of hashing  
2 circuits is a cyclic redundancy check (CRC) circuit that implements a respective  
3 one of a plurality of CRC polynomials.

1 16. The integrated circuit device of claim 14 wherein each of the plurality of hashing  
2 circuits operates concurrently with the others of the plurality of hashing circuits to  
3 generate the plurality of hash values.

1 17. The integrated circuit device of claim 14 further comprising a configuration circuit  
2 to output a hash function select value to the hash function select circuit, and  
3 wherein the hash function select circuit selects the one of the hash values according  
4 to the hash function select value.

1 18. The integrated circuit device of claim 1 wherein the compare circuit is adapted to  
2 compare a selected portion of the first data value with a selected portion of the  
3 search value, and wherein the match signal is indicative of whether the selected

4           portion of the first data value matches the selected portion of the search value.

1   19.   The integrated circuit device of claim 18 wherein the memory is further adapted to  
2           output, according to the index, mask information that indicates the selected portion  
3           of the first data value and the selected portion of the search value.

1   20.   The integrated circuit device of claim 19 wherein the mask information indicates  
2           another portion of the first data value and another portion of the search value to be  
3           masked from affecting the comparison of the first data value and the search value.

1   21.   The integrated circuit device of claim 19 wherein the mask information and the first  
2           data value are constituent values of a data entry at a selected address within the  
3           memory, the selected address being indicated by the index.

1   22.   The integrated circuit device of claim 19 wherein the mask information comprises  
2           mask bits that correspond to data bits within the first data value, each mask bit  
3           indicating whether the corresponding data bit is to be masked from affecting the  
4           comparison of the first data value and the search value.

1   23.   The integrated circuit device of claim 19 wherein the mask information comprises  
2           mask bits that correspond to data bits within the first data value, a first one of the  
3           mask bits indicating whether a first set of the data bits are to be masked from  
4           affecting a comparison of the first data value and the search value, and a second one  
5           of the mask bits indicating whether a second set of the data bits are to be masked  
6           from affecting a comparison of the first data value and the search value, the first set  
7           of the data bits including at least one of the data bits, and the first set of the data bits  
8           including a different number of the data bits than the second set of the data bits.

1 24. The integrated circuit device of claim 19 wherein the mask information comprises  
2 an encoded mask value and wherein the integrated circuit device further comprises  
3 a decoder circuit to receive the encoded mask value from the memory and to  
4 generate a decoded mask value.

1 25. The integrated circuit device of claim 24 wherein the decoded mask value  
2 comprises mask bits that correspond to data bits within the first data value, each  
3 mask bit indicating whether the corresponding data bit is to be masked from  
4 affecting the comparison of the first data value and the search value.

1 26. The integrated circuit device of claim 19 further comprising:  
2 a decoder circuit coupled to receive the mask information from the memory and  
3 adapted to decode the mask information to generate a decoded value; and  
4 a select circuit having a first input port coupled to receive the mask information  
5 from the memory and a second input port coupled to receive the decoded  
6 value from the decoder circuit, the select circuit being responsive to a select  
7 signal to select either the mask information or the decoded value to be output  
8 to the compare circuit.

1 27. The integrated circuit device of claim 1 wherein the memory is further adapted to  
2 output, according to the index, a first priority value that indicates a priority of the  
3 first data value.

1 28. The integrated circuit device of claim 27 wherein the interface is adapted to output  
2 the first priority value from the integrated circuit device.

1 29. The integrated circuit device of claim 27 wherein the first priority value and the  
2 first data value are constituent values of a data entry at a selected address within the  
3 memory, the selected address being indicated by the index.

1 30. The integrated circuit device of claim 1 wherein the memory is further adapted to  
2 output, according to the index, a control value that indicates a type of compare  
3 operation to be performed by the compare circuit.

1 31. The integrated circuit device of claim 30 wherein the compare circuit includes  
2 circuitry to perform a partially masked comparison of the search value and first data  
3 value if the control value indicates a ternary compare operation.

1 32. The integrated circuit device of claim 30 wherein the compare circuit includes  
2 circuitry to compare the search value against a range of values represented by the  
3 first data value if the control value indicates a range compare operation.

1 33. The integrated circuit device of claim 1 further comprising a select circuit coupled  
2 to the compare circuit and the interface, the select circuit being responsive to an  
3 operation select signal to select either the match signal or a status value that  
4 corresponds to the first data value to be output by the interface.

1 34. The integrated circuit device of claim 33 wherein the status value indicates whether  
2 the first data value is a valid data value.

1 35. The integrated circuit device of claim 34 further comprising an instruction decoder  
2 to generate the operation select signal according to an input instruction, the

3 instruction decoder being adapted to generate an operation select signal to select the  
4 status value if the input instruction is an instruction to determine availability of a  
5 storage location within the memory, the storage location being indicated by the  
6 index.

1 36. The integrated circuit device of claim 35 further comprising a content addressable  
2 memory (CAM) including a plurality of CAM cells to store the search value if the  
3 status value indicates that the first data value is a valid data value.

1 37. An integrated circuit device comprising:  
2 an index generator to generate a first index based on a selected portion of a search  
3 value;  
4 a memory to store a plurality of data values, the memory being coupled to receive  
5 the first index from the index generator and being adapted to output,  
6 according to the first index, a first data value of the plurality of data values;  
7 and  
8 a compare circuit coupled to the memory to receive the first data value, the compare  
9 circuit being adapted to compare the first data value with the search value and  
10 to generate a match signal indicative of whether the first data value matches  
11 the search value.

1 38. The integrated circuit device of claim 37 further comprising an assembler circuit  
2 coupled to the index generator, the assembler circuit to select the selected portion of  
3 the search value and output the selected portion of the search value to the index  
4 generator.

1 39. The integrated circuit device of claim 38 wherein the selected portion of the search  
2 value includes a first bit field within the search value.

1 40. The integrated circuit device of claim 39 wherein the selected portion of the search  
2 value further includes a second bit field within the search value, the second bit field  
3 being separated from the first bit field by at least one bit of the search value.

1 41. The integrated circuit device of claim 38 further comprising a configuration circuit  
2 coupled to the assembler circuit to provide an entry type value thereto, the  
3 assembler circuit being adapted to select the selected portion of the search value  
4 according to the entry type value.

1 42. The integrated circuit device of claim 37 wherein the index generator comprises:  
2 a plurality of subcircuits to generate a plurality of selectable indices; and  
3 a select circuit coupled to the plurality of subcircuits to receive the selectable  
4 indices therefrom, the select circuit being responsive to an index select signal  
5 to select one of the plurality of selectable indices to be the first index.

1 43. The integrated circuit device of claim 42 further comprising a configuration circuit  
2 coupled to the select circuit to provide the index select signal thereto.

1 44. The integrated circuit device of claim 37 wherein the index is a hash index and  
2 wherein the index generator includes a hash function circuit to generate the hash  
3 index based on the selected portion of the search value.

1 45. The integrated circuit device of claim 44 wherein the hash function circuit is a



2 cyclic redundancy check (CRC) circuit and wherein the hash index is a CRC value.

1 46. An integrated circuit device comprising:

2 an index generator to generate an index based on a search value;

3 a memory to store a plurality of data values, the memory being coupled to receive

4 the index from the index generator and being adapted to output, according to

5 the index, a first data value of the plurality of data values; and

6 a compare circuit to compare a selected portion of the first data value with a

7 selected portion of the search value and to generate a match signal indicative

8 of whether the selected portion of the first data value matches the selected

9 portion of the search value.

1 47. The integrated circuit device of claim 46 wherein the index generator is adapted to

2 generate an index having fewer constituent bits than the search value.

1 48. The integrated circuit device of claim 46 wherein the index generator includes an

2 assembler circuit to select the selected portion of the search value, the index being

3 generated based on the selected portion of the search value.

1 49. The integrated circuit device of claim 45 wherein the index is a hash index and

2 wherein the index generator includes a hash function circuit to generate the hash

3 index based on the selected portion of the search value.

1 50. The integrated circuit device of claim 49 wherein the hash function circuit is a

2 cyclic redundancy check (CRC) circuit and wherein the hash index is a CRC value.

1 51. The integrated circuit device of claim 46 wherein the memory is further adapted to

2 output, according to the index, mask information that indicates the selected portion  
3 of the first data value and the selected portion of the search value.

1 52. The integrated circuit device of claim 51 wherein the mask information indicates  
2 another portion of the first data value and another portion of the search value to be  
3 masked from affecting the comparison of the first data value and the search value.

1 53. The integrated circuit device of claim 51 wherein the mask information and the first  
2 data value are constituent values of a data entry at a selected address within the  
3 memory, the selected address being indicated by the index.

1 54. The integrated circuit device of claim 51 wherein the mask information comprises  
2 mask bits that correspond to data bits within the first data value, each mask bit  
3 indicating whether the corresponding bit of the first data value is to be masked from  
4 affecting the comparison of the first data value and the search value.

1 55. The integrated circuit device of claim 51 wherein the mask information comprises  
2 an encoded mask value and wherein the integrated circuit device further comprises  
3 a decoder circuit to receive the encoded mask value from the memory and to  
4 generate a decoded mask value.

1 56. The integrated circuit device of claim 55 wherein the decoded mask value  
2 comprises mask bits that correspond to data bits within the first data value, each  
3 mask bit indicating whether the corresponding data bit is to be masked from  
4 affecting the comparison of the first data value and the search value.

1 57. The integrated circuit device of claim 51 further comprising:

2 a decoder circuit coupled to receive the mask information from the memory and  
3 adapted to decode the mask information to generate a decoded value; and  
4 a select circuit having a first input port coupled to receive the mask information  
5 from the memory and a second input port coupled to receive the decoded  
6 value from the decoder circuit, the select circuit being responsive to a select  
7 signal to select either the mask information or the decoded value to be output  
8 to the compare circuit.

1 58. The integrated circuit device of claim 57 further comprising a configuration circuit  
2 coupled to the select circuit to provide the select circuit thereto.

1 59. An integrated circuit device comprising:  
2 an index generator to generate a search index based on a search value;  
3 a content addressable memory (CAM) to store a plurality of inserted indices, the  
4 CAM being adapted to generate an indication of one of the inserted indices  
5 that matches the search index;  
6 a data memory to store a plurality of data values and coupled to receive the  
7 indication from the CAM; the data memory being adapted to output,  
8 according to the indication, a first data value of the plurality of data values;  
9 and  
10 a compare circuit to compare the first data value with the search value and to  
11 generate a match signal indicative of whether the first data value matches the  
12 search value.

1 60. The integrated circuit device of claim 59 wherein the indication generated by the  
2 CAM comprises a plurality of match signals each indicative of whether a respective

3 one of the inserted indices matches the search index.

1 61. The integrated circuit device of claim 60 wherein the CAM comprises an encoder  
2 circuit to generate a row address according to the plurality of match signals, the row  
3 address corresponding to a storage location within the data memory at which the  
4 first data value is stored.

1 62. The integrated circuit device of claim 61 wherein the encoder circuit comprises a  
2 lookup table that is accessed, according to the plurality of match signals, to retrieve  
3 the row address therefrom.

1 63. The integrated circuit device of claim 61 further comprising an address storage  
2 circuit to store an address of an unoccupied row of CAM cells within the CAM.

1 64. The integrated circuit device of claim 63 further comprising a row address select  
2 circuit coupled to the address storage circuit and to the priority encoder, the row  
3 address select circuit being adapted to select either the address stored in the address  
4 storage circuit or the row address generated by the priority encoder to be at least  
5 part of an output address during a search to determine an available storage location  
6 within the data memory.

1 65. The integrated circuit device of claim 64 wherein the CAM further comprises a flag  
2 logic circuit to generate a flag signal having either a first state or a second state  
3 according to whether the plurality of match signals indicate that at least one of the  
4 inserted indices matches the search index, and wherein the address select circuit is  
5 adapted to select, according to the state of the flag signal, either the address stored  
6 in the address storage circuit or the row address generated by the priority encoder.

1 66. The integrated circuit device of claim 59 wherein the CAM comprises a plurality of  
2 rows of CAM cells, each row of CAM cells to store a respective one of the plurality  
3 of inserted indices.

1 67. The integrated circuit device of claim 59 wherein each of the inserted indices  
2 includes N constituent bits and the data memory includes M rows of storage cells,  
3 N being greater than  $\log_2 M$ .

1 68. The integrated circuit device of claim 59 wherein the search index is a hash index  
2 and wherein the index generator includes a hash function circuit to generate the  
3 search index based on a selected portion of the search value.

1 69. The integrated circuit device of claim 68 wherein the hash function circuit is a  
2 cyclic redundancy check (CRC) circuit and wherein the hash index is a CRC value.

1 70. An integrated circuit device comprising:  
2 an index generator to receive a search value and to convert the search value into a  
3 search index having fewer constituent bits than the search value;  
4 a content addressable memory (CAM) to store a plurality of inserted indices, the  
5 CAM being adapted to generate a plurality of match signals each indicative of  
6 whether a respective one of the inserted indices matches the search index; and  
7 a data memory to store a plurality of data values, the data memory being adapted to  
8 output, according to the match signals, a first data value of the plurality of  
9 data values.

1 71. The integrated circuit device of claim 70 further comprising a compare circuit to

2       compare the first data value with the search value and to generate a match signal  
3       indicative of whether the first data value matches the search value.

1   72.   The integrated circuit device of claim 71 wherein the compare circuit is adapted to  
2       compare a selected portion of the first data value with a selected portion of the  
3       search value, and wherein the match signal is indicative of whether the selected  
4       portion of the first data value matches the selected portion of the search value.

1   73.   The integrated circuit device of claim 72 wherein the memory is further adapted to  
2       output, according to the match signals, mask information that indicates the selected  
3       portion of the first data value and the selected portion of the search value.

1   74.   The integrated circuit device of claim 73 wherein the mask information indicates  
2       another portion of the first data value and another portion of the search value to be  
3       masked from affecting the comparison of the first data value and the search value.

1   75.   The integrated circuit device of claim 73 wherein the mask information and the first  
2       data value are constituent values of a data entry at a selected address within the  
3       memory, the selected address being indicated by the match signals.

1   76.   The integrated circuit device of claim 70 wherein the index generator includes a  
2       hash function circuit to generate the search index based on a selected portion of the  
3       search value.

1   77.   The integrated circuit device of claim 76 wherein the hash function circuit is a  
2       cyclic redundancy check (CRC) circuit and wherein the hash index is a CRC value.

1 78. The integrated circuit device of claim 70 wherein the index generator comprises:  
2 a plurality of subcircuits to generate a plurality of selectable indices; and  
3 a select circuit coupled to receive the selectable indices from the plurality of  
4 subcircuits, the select circuit being responsive to an index select signal to  
5 select one of the plurality of selectable indices to be the search index.

1 79. The integrated circuit device of claim 78 further comprising a configuration circuit  
2 coupled to the select circuit to provide the index select signal thereto.

1 80. The integrated circuit device of claim 70 wherein the index generator comprises:  
2 a plurality of hashing circuits to generate a plurality of hash values based on the  
3 search value; and  
4 a hash function select circuit to select one of the hash values to be the search index.

1 81. The integrated circuit device of claim 80 wherein each of the plurality of hashing  
2 circuits is a cyclic redundancy check (CRC) circuit that implements a respective  
3 one of a plurality of CRC polynomials.

1 82. An integrated circuit device comprising:  
2 a plurality of index generators to generate respective indices based on a search  
3 value;  
4 a select circuit to select a first index of the indices generated by the plurality of  
5 index generators;  
6 a memory to store a plurality of data values, the memory being coupled to receive  
7 the first index and being adapted to output, according to the first index, a first  
8 data value of the plurality of data values; and

9 a compare circuit coupled to receive the search value from the interface and to  
10 receive the first data value from the memory, the compare circuit being  
11 adapted to compare the first data value with the search value and to generate a  
12 match signal indicative of whether the first data value matches the search  
13 value.

1 83. The integrated circuit device of claim 82 further comprising a configuration circuit  
2 to output an index select signal to the select circuit, the select circuit being adapted  
3 to select the first index according to the index select signal.

1 84. The integrated circuit device of claim 82 wherein at least one of the plurality of  
2 index generators is a hash index generator to generate a hash index based on the  
3 search value, the hash index having fewer constituent bits than the search value.

1 85. The integrated circuit device of claim 84 wherein the hash index generator is a  
2 cyclic redundancy check (CRC) circuit and wherein the hash index is a CRC value.

1 86. The integrated circuit device of claim 82 wherein the memory comprises a data  
2 memory to store the plurality of data values, and a content addressable memory  
3 (CAM) to receive the first index and to generate a plurality of match signals that  
4 each indicate whether the first index matches an index stored within the CAM, the  
5 data memory being coupled to receive the match signals from the CAM and being  
6 adapted to select, according to the match signals, the first data value from among  
7 the plurality of data values.

1 87. The integrated circuit device of claim 82 wherein the compare circuit is adapted to  
2 compare a selected portion of the first data value with a selected portion of the



3 search value, and wherein the match signal is indicative of whether the selected  
4 portion of the first data value matches the selected portion of the search value.

1 88. The integrated circuit device of claim 87 wherein the memory is further adapted to  
2 output, according to the match signals, mask information that indicates the selected  
3 portion of the first data value and the selected portion of the search value.

1 89. An integrated circuit device comprising:  
2 a plurality of index generators to generate a plurality of indices based on an input  
3 value;  
4 a plurality of memories coupled respectively to the plurality of index generators,  
5 each memory including a storage array to store a respective plurality of data  
6 values and being adapted to output, according to a respective one of the  
7 indices, a selected data value of the plurality of data values, the selected data  
8 value including a priority value;  
9 a plurality of compare circuits each coupled to receive the selected data value from  
10 a respective one of the memories and adapted to compare the input value to  
11 the selected data value and to generate a match signal indicative of whether  
12 the selected data value matches the input value; and  
13 a priority encoder coupled to receive the match signal from each compare circuit  
14 and the priority value from the selected data value output by each memory,  
15 the priority encoder being adapted to generate, according to the match signals  
16 and priority values, a value that identifies one of the plurality of memories.

1 90. The integrated circuit device of claim 89 wherein the plurality of indices are hash  
2 indices and wherein each of the plurality of index generators is a hash index

3 generator to generate a respective one of the hash indices based on the input value.

1 91. The integrated circuit device of claim 89 wherein each of the plurality of index

2 generators comprises:

3 a plurality of hash function circuits to generate a plurality of hash values based on  
4 the input value; and

5 a hash function select circuit to select one of the hash values to be one of the  
6 plurality of indices.

1 92. The integrated circuit device of claim 91 wherein each of the plurality of hashing

2 circuits is a cyclic redundancy check (CRC) circuit and wherein each of the

3 plurality of hash values is a CRC value.

1 93. The integrated circuit device of claim 91 further comprising a configuration circuit

2 coupled to output a select signal to the hash function select circuit, the hash

3 function select circuit being adapted to select the one of the hash values in

4 accordance with the select signal.

1 94. The integrated circuit device of claim 89 wherein each of the memories further

2 includes a content addressable memory (CAM) to receive the respective one of the

3 indices and to generate a plurality of match signals that each indicate whether the

4 respective one of the indices matches an index stored within the CAM, the storage

5 array being coupled to receive the match signals from the CAM and being adapted

6 to select, according to the match signals, the selected data value from among the

7 plurality of data values.

1 95. The integrated circuit device of claim 89 wherein each of the compare circuits is

2 adapted to compare a selected portion of the selected data value from the respective  
3 one of the memories with a selected portion of the search value, and wherein the  
4 match signal is indicative of whether the selected portion of the selected data value  
5 matches the selected portion of the search value.

1 96. The integrated circuit device of claim 89 wherein the priority encoder is further  
2 adapted to compare the priority values output from the memories and to select, in  
3 accordance with the match signals, a highest priority one of the priority values.

1 97. The integrated circuit device of claim 89 wherein at least one of the plurality of  
2 memories has a different storage capacity than another one of the plurality of  
3 memories.

1 98. An integrated circuit device comprising:  
2 an interface to receive a search value and a corresponding search code;  
3 a plurality of circuit blocks coupled to the interface to receive the search value and  
4 search code therefrom, each circuit block including:  
5 an index generator to generate an index based on the search value;  
6 a select circuit to generate an enable signal based on the search code;  
7 a memory to store a plurality of data values, the memory being coupled to  
8 receive the index from the index generator and being adapted to output,  
9 according to the index, a selected data value of the plurality of data  
10 values; and  
11 a compare circuit coupled to receive the selected data value and the enable  
12 signal, the compare circuit being adapted to generate, if the enable signal  
13 is in a first state, a match signal indicative of whether the first data value

- 1 99. The integrated circuit device of claim 98 wherein each of the plurality of circuit  
2 blocks further comprises a configuration circuit to store an entry type value that  
3 indicates a data type of the plurality of data values stored in the corresponding  
4 memory.
- 1 100. The integrated circuit device of claim 99 wherein the data type indicates a bitwise  
2 format of each of the plurality of data values stored in the corresponding memory.
- 1 101. The integrated circuit device of claim 99 wherein the data type indicates at least one  
2 of the following data formats: Internet Protocol Version 4 (IPv4), Internet Protocol  
3 Version 6 (IPv6), and Multiprotocol Label Switching (MPLS).
- 1 102. The integrated circuit device of claim 99 wherein the search code indicates a data  
2 type of the search value and wherein the select circuit is coupled to receive the  
3 entry type value from the configuration circuit and includes a first comparator  
4 circuit to compare the entry type value with the search code and to generate a first  
5 result signal having a first state if the entry type value and search code match, the  
6 enable signal having either a first state or a second state depending, at least in part,  
7 on the state of the first result signal.
- 1 103. The integrated circuit device of claim 99 wherein each of the plurality of circuit  
2 blocks further includes a mask circuit to mask selected bits within the search value  
3 to generate a masked search value, the index generator being adapted to generate  
4 the index based on the masked search value.

1 104. The integrated circuit device of claim 103 wherein the configuration circuit is  
2 adapted to store a mask value that indicates the selected bits within search value to  
3 be masked.

1 105. The integrated circuit device of claim 104 wherein the search code indicates a  
2 maskable set of bits within the search value and wherein the select circuit is coupled  
3 to receive the mask value from the configuration circuit and includes a second  
4 comparator circuit to compare the mask value with the search code and to generate  
5 a second result signal having a first state if the mask value and search code match,  
6 the enable signal having either a first state or a second state depending on the state  
7 of the second result signal and the state of the first result signal.

1 106. An integrated circuit device comprising:

2 a first circuit block including:

3 an index generator to generate an index based on a search value;

4 a memory to store a first plurality of data values, the memory being coupled to  
5 receive the index from the index generator and being adapted to output,  
6 according to the index, a selected data value of the first plurality of data  
7 values; and

8 a compare circuit to generate a first match signal indicative of whether the  
9 selected data value matches the search value; and

10 a second circuit block including an array of storage cells to store a second plurality  
11 of data values and a plurality of compare circuits to compare the search value  
12 simultaneously to each data value of the second plurality of data values and to  
13 generate a second match signal indicative of whether any of the second

14 plurality of data values matches the search value.

1 107. The integrated circuit device of claim 106 wherein the second circuit block  
2 comprises an array of CAM cells that includes the array of storage cells and the  
3 plurality of compare circuits, each of the CAM cells including a respective one of  
4 the storage cells and a respective one of the compare circuits.

1 108. The integrated circuit device of claim 106 wherein the index generator includes an  
2 assembler circuit to select a portion of the search value, the index being generated  
3 based on the portion of the search value.

1 109. The integrated circuit device of claim 106 wherein the index is a hash index and  
2 wherein the index generator includes a hash function circuit to generate the hash  
3 index based on a selected portion of the search value.

1 110. The integrated circuit device of claim 109 wherein the hash function circuit is a  
2 cyclic redundancy check (CRC) circuit and wherein the hash index is a CRC value.

1 111. An integrated circuit device comprising:  
2 a plurality of circuit blocks to generate, in response to a first instruction, a plurality  
3 of priority values, each priority value indicating a storage capacity of a  
4 corresponding one of the circuit blocks;  
5 a priority encoder coupled to receive the plurality of priority values from the circuit  
6 blocks and being adapted to generate, based on the priority values, a block  
7 identifier that identifies one of the circuit blocks.

1 112. The integrated circuit device of claim 111 further comprising an interface to output

2 the block identifier from the integrated circuit device.

1 113. The integrated circuit device of claim 111 wherein each of the plurality of circuit  
2 blocks is further adapted to generate an address value indicative of an unoccupied  
3 storage location within the circuit block.

1 114. The integrated circuit device of claim 113 wherein the priority encoder selects the  
2 address value from the one of the circuit blocks identified by the block identifier to  
3 be output from the integrated circuit.

1 115. The integrated circuit device of claim 111 wherein each of the plurality of circuit  
2 blocks includes a fill counter to maintain a count value that indicates the storage  
3 capacity of the circuit block, and wherein the priority value is generated, at least in  
4 part, based on the count value.

1 116. The integrated circuit device of claim 115 wherein the count value indicates a  
2 number of occupied storage locations within the circuit block.

1 117. The integrated circuit device of claim 115 wherein the count value indicates a  
2 number of unoccupied storage locations within the circuit block.

1 118. An integrated circuit device comprising:  
2 an index generator to generate a plurality of indices based on a search value; and  
3 a plurality of circuit blocks coupled to the index generator to receive the indices,  
4 each of the circuit blocks including:  
5 a select circuit to select one of the indices;  
6 a memory to store a plurality of data values and to output, in response to the

7                   one of the indices, a selected data value of the plurality of data values;  
8                   and  
9                   a compare circuit coupled to receive the search value from the interface and to  
10                  receive the selected data value from the memory, the compare circuit  
11                  being adapted to generate a match signal indicative of whether the  
12                  selected data value matches the search value.

1   119. The integrated circuit device of claim 118 wherein each of the plurality of indices  
2       has fewer constituent bits than the search value.

1   120. The integrated circuit device of claim 118 wherein the index generator includes a  
2       circuit to select a portion of the search value, the plurality of indices being  
3       generated based on the portion of the search value.

1   121. The integrated circuit device of claim 118 wherein each of the circuit blocks further  
2       includes a configuration circuit to store a select value, the select circuit being  
3       coupled to receive the select value from the configuration circuit and being adapted  
4       to select the one of the indices according to the select value.

1   122. The integrated circuit device of claim 118 wherein the index generator is a hash  
2       index generator to generate a plurality of hash indices.

1   123. An integrated circuit device comprising:  
2       a first memory;  
3       a second memory to store a plurality of indices;  
4       means for generating a search index based on a search value;  
5       means for identifying an index stored within the second memory that matches the



6 search index; and  
7 means for determining whether the search value matches a data value stored at a  
8 first location within the first memory, the first location corresponding to a  
9 location of the index stored within the second memory.

1 124. The integrated circuit device of claim 123 wherein the means for generating the  
2 search index based on the search value comprises means for selecting a portion of  
3 the search value and means for generating the search index based on the selected  
4 portion of the search value.

1 125. The integrated circuit device of claim 124 wherein the means for selecting the  
2 portion of the search value comprises means for selecting the portion of the search  
3 value in accordance with a configuration value within the integrated circuit device.

1 126. The integrated circuit device of claim 123 wherein the means for generating the  
2 search index based on the search value comprises means for generating a search  
3 index having fewer constituent bits than the search value.

1 127. The integrated circuit device of claim 123 wherein the means for identifying the  
2 index stored within the second memory that matches the search index comprises  
3 means for comparing the search index with each of the indices stored within the  
4 second memory.

1 128. The integrated circuit device of claim 127 wherein the means for identifying the  
2 index stored within the second memory that matches the search index further  
3 comprises means for generating a plurality of match signals, each match signal  
4 indicating whether a respective one of the indices stored within the second memory

5 matches the search index.

1 129. The integrated circuit device of claim 123 wherein the second memory is a content

2 addressable memory (CAM).